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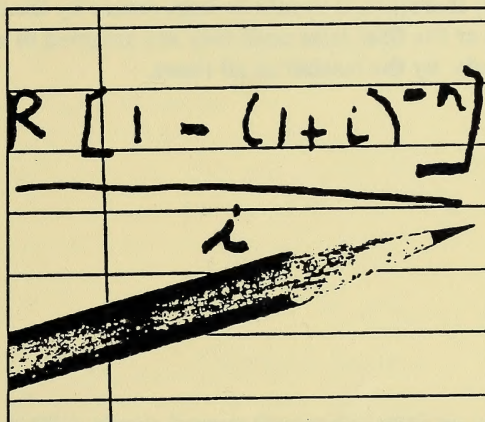


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MATHEMATICS 33

Annuities



Unit 7

Learning Facilitator's Manual



**Distance
Learning**

Alberta
EDUCATION

Note

This Mathematics Learning Facilitator's Manual contains answers to teacher-assessed assignments and the final test; therefore, it should be kept secure by the teacher. Students should not have access to these assignments or the final tests until they are assigned in a supervised situation. The answers should be stored securely by the teacher at all times.

Mathematics 33
Learning Facilitator's Manual
Unit 7
Annuities
Alberta Distance Learning Centre
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Topic 1: Simple Interest and Compound Interest

②

1. If the formula for simple interest is given by $I = P \times r \times t$, what is the formula for time t ? To find this formula isolate the t on either side of the equation.

If $I = P \times r \times t$, then t is calculated as follows:

$$\frac{I}{P \times r} = \frac{P \times r \times t}{P \times r}$$

$$\frac{I}{P \times r} = \frac{\overset{1}{\cancel{P}} \times \overset{1}{\cancel{r}} \times t}{\underset{1}{\cancel{P}} \times \underset{1}{\cancel{r}}}$$

$$\frac{I}{P \times r} = t$$

$$\text{or } t = \frac{I}{P \times r}$$

③

2. How much money must Ingrid invest at 6% a simple interest for a period of thirty-six months in order to earn interest of \$1050?

From the formula $I = P \times r \times t$, you need to find P .

$$\$1050 = P \times \frac{6}{100} \times \frac{36}{12}$$

$$\$1050 = P(0.06) \times 3$$

$$\$1050 = 0.18P$$

$$0.18P = \$1050$$

$$\frac{0.18P}{0.18} = \frac{\$1050}{0.18}$$

$$P = \$5833.333\ 333$$

$$= \$5833.33$$

Ingrid must invest \$5833.33 in order to earn \$1050 in thirty-six months.

4

3. Find the amount needed to repay a loan of \$5000 at the end of five years if the interest at 9%/a is compounded quarterly.

Use the formula $A = P(1+i)^n$, where n = number of periods, i = rate per period, and P = principal.

$$n = 5 \times 4$$

$$= 20$$

$$i = 9\% \div 4$$

$$= 2\frac{1}{4}\%$$

$$= 0.0225$$

$$P = \$5000$$

$$A = P(1+i)^n$$

$$= \$5000(1+0.0225)^{20}$$

$$= \$5000(1.0225)^{20}$$

$$= \$5000(1.5605092)$$

$$= \$7802.546$$

$$= \$7802.55$$

The amount needed to repay this loan is \$7802.55.

③

4. Find the principal if the interest received after two years and ten months at 12%/a simple interest was \$800.

Since $I = P \times r \times t$, then P is calculated as follows:

$$\frac{I}{rt} = \frac{P \times \cancel{r} \times \cancel{t}}{\cancel{r} \times \cancel{t}}$$

$$P = \frac{I}{rt}$$

$$= \frac{\$800}{12\% \times 2\frac{10}{12}}$$

$$= \frac{\$800}{0.12 \times \frac{34}{12}}$$

$$= \$800 \div \left(0.12 \times \frac{34}{12}\right)$$

$$= \$800 \div \frac{4.08}{12}$$

$$= \$800 \times \frac{12}{4.08}$$

$$= \frac{\$9600}{4.08}$$

$$= \$2352.941176$$

$$= \$2352.94$$

$$I = \$800$$

$$r = 12\%$$

$$= 0.12$$

$$t = 2\frac{10}{12}$$

$$= 34 \text{ months}$$

The amount of principal invested would have been \$2352.94.

- ④ 5. Calculate the amount needed to repay a loan of \$6050 at the end of four years if the interest at 13%/a is compounded semiannually. How much of this amount was interest?

$$A = P(1+i)^n$$

$$= \$6050(1+0.065)^8$$

$$= \$6050(1.065)^8$$

$$= \$6050(1.654\ 995\ 671)$$

$$= \$10\ 012.723\ 81$$

$$= \$10\ 012.72$$

$$P = \$6050$$

$$i = 13\% \div 2$$

$$= 6.5\%$$

$$= 0.065$$

$$n = 4 \times 2$$

$$= 8$$

$$\text{Portion applied to interest} = \$10\ 012.72 - \$6050.00$$

$$= \$3962.72$$

$$\text{Amount to repay loan} = \$10\ 012.72$$

$$\text{Amount applied to interest} = \$3962.72$$

- ④ 6. Write an equation for the amount (A) for each of the following investments. Give your answer in the form $A = P(1+i)^n$.

- a. \$1200 for $3\frac{1}{2}$ years at 4.8%/a compounded monthly

$$A = P(1+i)^n$$

$$= \$1200(1+0.004)^{42}$$

- b. \$8000 for 19 years at 12.5%/a compounded semiannually

$$A = P(1+i)^n$$

$$= \$8000(1+0.0625)^{38}$$

- ⑥ 7. Mien Lui invested \$4800 at 11%/a for six years.

- a. What will be the accumulated investment if the interest is compounded quarterly?

$$\begin{aligned}
 A &= P(1+i)^n \\
 &= \$4800(1+0.0275)^{24} \\
 &= \$4800(1.917\ 626\ 105) \\
 &= \$9204.605\ 303 \\
 &= \$9204.61
 \end{aligned}$$

This accumulated investment amounts to \$9204.61.

- b. What will be the accumulated investment if the interest is compounded semiannually?

$$\begin{aligned}
 A &= \$4800(1+0.055)^{12} \\
 &= \$4800(1.055)^{12} \\
 &= \$4800(1.901\ 207\ 486) \\
 &= \$9125.795\ 931 \\
 &= \$9125.80
 \end{aligned}$$

This accumulated investment amounts to \$9125.80.

- c. What is the difference in the interest earned when the interest is compounded quarterly and when the interest is compounded semiannually?

The interest earned in a is as follows:

$$\begin{aligned}
 I_1 &= A - P \\
 &= \$9204.61 - \$4800.00 \\
 &= \$4404.61
 \end{aligned}$$

The interest earned in b is as follows:

$$\begin{aligned}
 I_2 &= \$9125.80 - \$4800.00 \\
 &= \$4325.80
 \end{aligned}$$

Therefore, the difference in the interest earned is $I_1 - I_2 = \$4404.61 - \$4325.80 = \$78.81$.

4

8. Silas has to borrow \$7500 and needs this loan for five years. One bank lends money at a rate of 15%/a compounded monthly. Another bank lends money at 16%/a compounded annually. Which bank should he borrow from? How much would he save if he chooses the bank which charges less?

Bank 1

$$\begin{aligned}
 A &= P(1+i)^n \\
 &= \$7500(1+0.0125)^{60} \\
 &= \$7500(1.0125)^{60} \\
 &= \$7500(2.107181347) \\
 &= \$15\,803.8601 \\
 &= \$15\,803.86
 \end{aligned}$$

The amount to be paid back is
\$15 803.86.

Bank 2

$$\begin{aligned}
 A &= P(1+i)^n \\
 &= \$7500(1+0.16)^5 \\
 &= \$7500(1.16)^5 \\
 &= \$7500(2.100341658) \\
 &= \$15\,752.56243 \\
 &= \$15\,752.56
 \end{aligned}$$

The amount to be paid back is
\$15 752.56.

Silas should borrow from the bank that lends money at 16% rather than from the bank that lends money at 15%.

This way Silas would save $\$15\,803.86 - \$15\,752.56 = \$51.30$.

Topic 1

_____ marks

Topic 2: Introducing Annuities

②

1. An investment plan in which fixed amounts of money are deposited or paid out at regular intervals over a specified period of time is called

- A. a perpetuity
- B. a mortgage
- C. an instalment
- ☒ D. an annuity

The correct response is D.

②

2. The formula for the amount when a sum of money is compounded over a period of time is given by

A. $I = P \times r \times t$

☒ B. $A = P(1+i)^n$

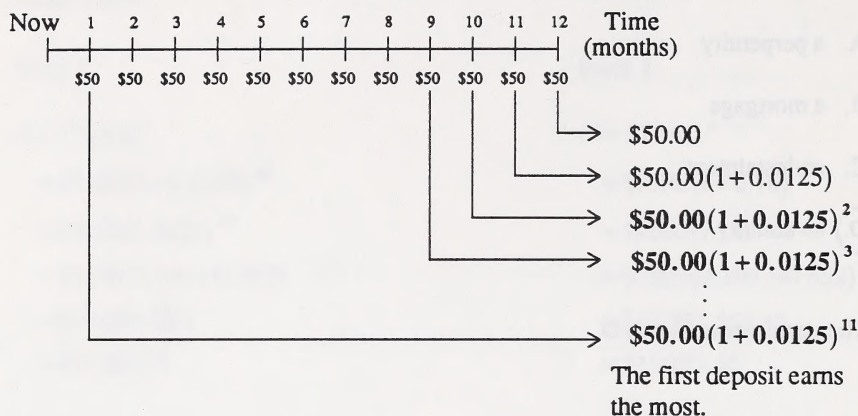
C. $A = P + I$

D. $I = \frac{P \times r \times t}{100}$

The correct response is B.

7

3. Naresh is saving for a vacation. If he saves \$50 at the end of each month and deposits it in a bank that pays 15%/a compounded monthly, how much will he save in twelve months? Use a time line to find the amount of money saved.



You must add all the deposits and the interest that each deposit earns.

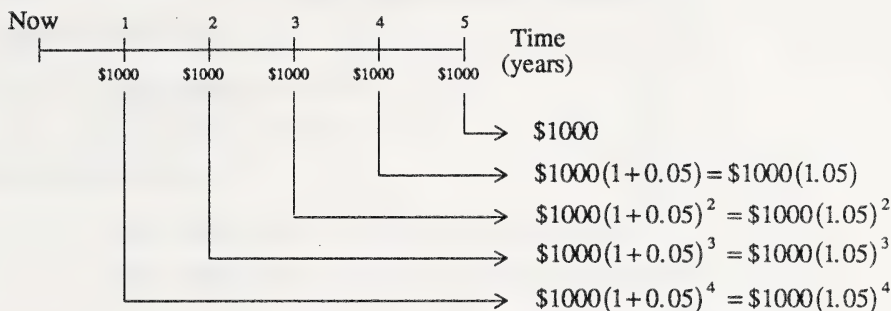
$$\begin{aligned}
 A &= \$50 + \$50(1.0125) + \$50(1.0125)^2 + \$50(1.0125)^3 + \dots + \$50(1.0125)^{11} \\
 &= \$50.00 + \$50.625 + \$51.257\,812\,5 + \$51.898\,535\,16 + \$52.547\,266\,85 + \$53.204\,107\,68 \\
 &\quad + \$53.869\,159\,03 + \$54.542\,523\,51 + \$55.224\,305\,06 + \$55.914\,608\,87 + \$56.613\,541\,48 \\
 &\quad + \$57.321\,210\,75 \\
 &= \$643.018\,070\,9 \\
 &= \$643.02
 \end{aligned}$$

Naresh will save \$643.02 in one year.

4

4. Henrietta plans to put away \$1000 each year for the next five years. She makes her deposits at the end of each year. If the bank pays interest at 5%/a compounded annually, find the accumulated amount of this annuity after each of the following. (Be sure to draw a time line first.)

- a. three deposits



After three deposits, Henrietta has the following amount:

$$\begin{aligned}
 A &= \$1000 + \$1000(1.05) + \$1000(1.05)^2 \\
 &= \$1000.00 + \$1050.00 + \$1000(1.1025) \\
 &= \$1000.00 + \$1050.00 + \$1102.50 \\
 &= \$3152.50
 \end{aligned}$$

Henrietta would accumulate \$3152.50 after three deposits.

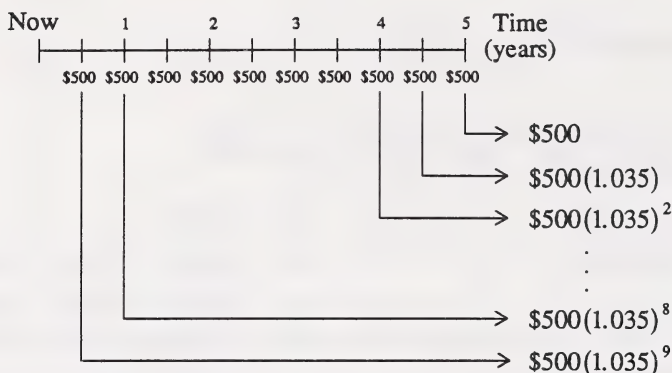
- b. five deposits

After five years, Henrietta has the following amount:

$$\begin{aligned}
 A &= \$1000 + \$1000(1.05) + \$1000(1.05)^2 + \$1000(1.05)^3 + \$1000(1.05)^4 \\
 &= \$1000.00 + \$1050.00 + \$1000(1.1025) + \$1000(1.157625) + \$1000(1.21550625) \\
 &= \$1000.00 + \$1050.00 + \$1102.50 + \$1157.625 + \$1215.50625 \\
 &= \$5525.63125 \\
 &= \$5525.63
 \end{aligned}$$

Henrietta would accumulate \$5525.63 after five deposits.

5. Akeem deposited \$500 every six months for a period of five years. If the rate of interest was 7%/a compounded every six months, what was the total amount after the tenth deposit? Use a time line to calculate the amount.



$$\begin{aligned}
 A &= \$500 + \$500(1.035) + \dots + \$500(1.035)^8 + \$500(1.035)^9 \\
 &= \$500.00 + \$517.50 + \$500(1.071\,225) + \$500(1.108\,717\,875) + \$500(1.147\,523) \\
 &\quad + \$500(1.187\,686\,306) + \$500(1.229\,255\,326) + \$500(1.272\,279\,263) \\
 &\quad + \$500(1.316\,809\,037) + \$500(1.362\,897\,353) \\
 &= \$500.00 + \$517.50 + \$535.6125 + \$554.358\,937\,5 + \$573.7615 + \$593.843\,153 \\
 &\quad + \$614.627\,663\,2 + \$636.139\,631\,4 + \$658.404\,518\,5 + \$681.448\,676\,6 \\
 &= \$5865.696\,58 \\
 &= \$5865.70
 \end{aligned}$$

After five years the amount of this annuity was \$5865.70.

- 1 6. In the formula $A = P(1+i)^n$, the exponent n stands for
- A. the number of years
 - B. the number of payments per year
 - ☒ C. the number of periods
 - D. the number of percents

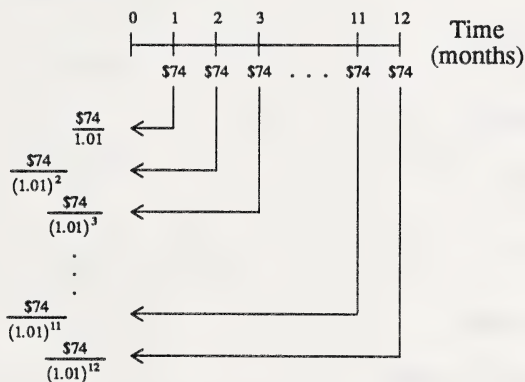
The correct response is C.

- 1 7. In the formula $P = \frac{A}{(1+i)^n}$, the i represents

- A. the interest per period
 B. the simple interest
 C. the annual interest rate
 D. the insurance on the loan

The correct response is A.

- 6 8. Find the present value if twelve equal payments of \$74 are to be made at equal intervals of one month each for a period of one year. The interest rate is 12%/a. Use a time line to calculate the present value.

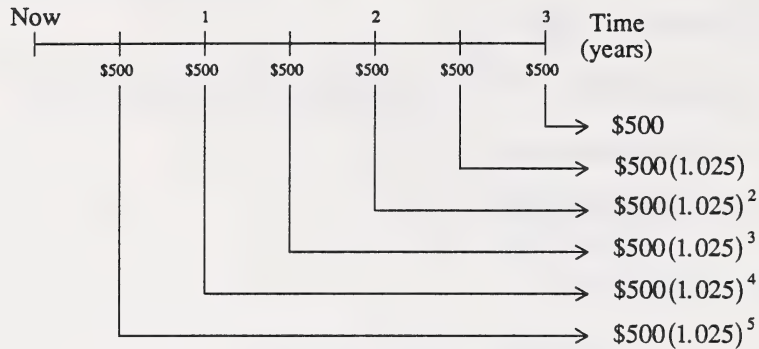


$$\text{Present Value} = \frac{\$74}{1.01} + \frac{\$74}{(1.01)^2} + \frac{\$74}{(1.01)^3} + \dots + \frac{\$74}{(1.01)^{12}}$$

$$\begin{aligned} PV &= \$73.267\,326\,73 + \$72.541\,907\,66 + \$71.823\,670\,95 + \$71.112\,545\,5 \\ &\quad + \$70.408\,460\,89 + \$69.711\,347\,42 + \$69.021\,136\,05 + \$68.337\,758\,47 \\ &\quad + \$67.661\,147 + \$66.991\,234\,65 + \$66.327\,955\,1 + \$65.671\,242\,67 \\ &= \$832.875\,733\,1 \\ &= \$832.88 \end{aligned}$$

7

9. The following diagram of a time line shows an annuity.



- a. How many deposits were made?

There were six deposits made.

- b. How much was each deposit?

Each deposit was for \$500.

- c. What was the annual interest rate?

The annual rate of interest was 5%.

- d. What was the rate per period?

The rate per period was $2\frac{1}{2}\%$.

- e. How often were the deposits made?

The deposits were made every six months.

- f. For what period of time was the annuity?

The annuity was for three years.

- g. What was the term of the annuity?

The term was semiannual.

Topic 2

_____ marks

Topic 3: Calculating the Amount and the Present Value for Annuities

- ① 1. To which of the following does the expression $\frac{R[1-(1+i)^{-n}]}{i}$ refer?

- A. amount of an annuity
- B. compound interest formula
- ③ C. present value of an annuity
- D. simple interest formula

The correct response is C.

- ① 2. Which of the following statements expresses the amount of an annuity?

③ A. $\frac{R[(1+i)^n - 1]}{i}$

B. $P(1+i)^n$

C. $\frac{A}{(1+i)^n}$

D. $\frac{R[1-(1+i)^{-n}]}{i}$

The correct response is A.

5

3. Nakita deposits \$60 every month into an account that pays 12%/a compounded monthly. How much does she save in a year? Round your answer to the nearest dollar.

Use $A = \frac{R[(1+i)^n - 1]}{i}$, where $R = \$60$, $n = 12$, and $i = \frac{12\%}{12}$ or 1% or 0.01.

$$\begin{aligned}
 A &= \frac{\$60[(1+0.01)^{12} - 1]}{0.01} \\
 &= \frac{\$60[(1.01)^{12} - 1]}{0.01} \\
 &= \frac{\$60(1.12682503 - 1)}{0.01} \\
 &= \frac{\$60(0.12682503)}{0.01} \\
 &= \frac{\$7.609501806}{0.01} \\
 &= \$760.9501806 \\
 &= \$761
 \end{aligned}$$

Susan saves about \$761 in a year.

5

4. Ludwig saved \$791 at the Colonial Bank over a five-year period by making semiannual deposits. His money earned him 12%/a compounded semiannually. What was the amount of each deposit if he made one every six months? Round your answer to the nearest dollar.

Use $A = \frac{R[(1+i)^n - 1]}{i}$, where A = amount saved or \$791,

R = periodic deposit which is unknown,

i = rate per period or 6%, and

n = number of periods or 10.

You are asked to find R .

Start with $A = \frac{R[(1+i)^n - 1]}{i}$.

Multiply both sides by i to get $Ai = R[(1+i)^n - 1]$.

Divide both sides by $[(1+i)^n - 1]$ to isolate R .

$$\frac{\cancel{R[(1+i)^n - 1]}}{\cancel{[(1+i)^n - 1]}} = \frac{Ai}{[(1+i)^n - 1]}$$

Cancel the common factors to get $R = \frac{Ai}{(1+i)^n - 1}$.

$$\begin{aligned} R &= \frac{\$791(0.06)}{(1+0.06)^{10} - 1} \\ &= \frac{\$47.46}{1.790\,847\,697 - 1} \\ &= \frac{\$47.46}{0.790\,847\,697} \\ &= \$60.011\,555 \\ &= \$60.01 \\ &= \$60 \end{aligned}$$

Ludwig's deposit was \$60 every six months.

5

5. What is the present value of an annuity that provides payments of \$200 paid at the end of every three months for a period of fifteen years. The interest rate is 10%/a compounded quarterly. Round your answer to the nearest dollar.

$$\text{Use } PV = \frac{R[1 - (1 + i)^{-n}]}{i} \text{ where } R = \$200,$$

$$i = \frac{10\%}{4} \text{ or } 2\frac{1}{2}\% \text{ or } 0.025, \text{ and}$$

$$n = 15 \times 4$$

$$= 60.$$

$$PV = \frac{\$200[1 - (1.025)^{-60}]}{0.025}$$

$$= \frac{\$200(1 - 0.227283587)}{0.025}$$

$$= \frac{\$200(0.772716412)}{0.025}$$

$$= \frac{\$154.5432824}{0.025}$$

$$= \$6181.731297$$

$$= \$6182$$

The present value of this annuity is \$6182.

6

6. The present value of an annuity is \$2690. What is the amount of each payment if the investment is for fifteen years at 10%/a compounded semiannually and if a payment is made once every six months? Express your answer to the nearest dollar.

Use $PV = \frac{R[1-(1+i)^{-n}]}{i}$ to isolate the R .

Multiply both sides by i to get $PV(i) = R[1-(1+i)^{-n}]$.

Divide both sides by $[1-(1+i)^{-n}]$.

$$\frac{R \cancel{[1-(1+i)^{-n}]}_1}{\cancel{[1-(1+i)^{-n}]}_1} = \frac{PV(i)}{[1-(1+i)^{-n}]}$$

Cancel the common factors to get $R = \frac{PV(i)}{[1-(1+i)^{-n}]}$.

$$\begin{aligned} \text{Therefore, } R &= \frac{\$2690(0.05)}{[1-(1+0.05)^{-30}]} \\ &= \frac{\$134.5}{[1-(1.05)^{-30}]} \\ &= \frac{\$134.5}{1-0.231377448} \\ &= \frac{\$134.5}{0.768622551} \\ &= \$174.9883604 \\ &= \$175 \end{aligned}$$

The amount of each payment is \$175.

Use the **Amount of an Annuity Table** at the end of the Assignment Booklet to find the amount (A) for questions 7, 8, 9, and 10. You are given $A = Rs_{\overline{n}|i}$, where R is the periodic payment, A is the total amount of the annuity, and $s_{\overline{n}|i}$ is the amount of annuity of \$1 for n periods at the rate i (readings from the table).

③ 7. $A = \$2250 s_{\overline{12}|1\%}$

$$\begin{aligned} A &= Rs_{\overline{n}|i} \\ &= \$2250 s_{\overline{12}|0.01} \\ &= \$2250(12.68250) \\ &= \$28535.625 \\ &= \$28535.63 \end{aligned}$$

③ 8. $A = \$48.50 s_{\overline{20}|2.5\%}$

$$\begin{aligned} A &= Rs_{\overline{n}|i} \\ &= \$48.50 s_{\overline{20}|0.025} \\ &= \$48.50(25.54466) \\ &= \$1238.91601 \\ &= \$1238.92 \end{aligned}$$

③

9. Find A if $R = \$35.25$, $n = 50$, and $i = 3\%$.

$$\begin{aligned}
 A &= Rs_{\overline{n}|i} \\
 &= \$35.25 s_{\overline{50}|3\%} \\
 &= \$35.25 s_{\overline{50}|0.03} \\
 &= \$35.25(112.79687) \\
 &= \$3976.089668 \\
 &= \$3976.09
 \end{aligned}$$

③

10. Find the amount of an annuity if the monthly instalment is \$72.90, the number of periods (n) is nineteen, and the rate per period (i) is 1.5%.

$$\begin{aligned}
 A &= Rs_{\overline{n}|i} \\
 &= \$72.90 s_{\overline{19}|0.015} \\
 &= \$72.90(21.79672) \\
 &= \$1588.980888 \\
 &= \$1588.98
 \end{aligned}$$

Topic 3

_____ marks

Amount of an Annuity

$$S_{\overline{n}|i} = \frac{(1+i)^n - 1}{i}$$

n	$\frac{1}{2}\%$	1%	1½%	2%	2½%	3%	3½%	n
1	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1
2	2.00500	2.01000	2.01500	2.02000	2.02500	2.03000	2.03500	2
3	3.01503	3.03010	3.04523	3.06040	3.07563	3.09090	3.10623	3
4	4.03010	4.06040	4.09090	4.12161	4.15252	4.18363	4.21404	4
5	5.05025	5.10101	5.15227	5.20404	5.25633	5.30914	5.36247	5
6	6.07550	6.15202	6.22955	6.30812	6.38774	6.46841	6.55015	6
7	7.10588	7.21354	7.32299	7.43428	7.54743	7.66246	7.77948	7
8	8.14141	8.28567	8.43284	8.58297	8.73612	8.89237	9.05169	8
9	9.18212	9.36853	9.55933	9.75463	9.95452	10.15911	10.36850	9
10	10.22803	10.46221	10.70272	10.94972	11.20338	11.46388	11.73139	10
11	11.27917	11.56683	11.86326	12.16872	12.48347	12.80780	13.14199	11
12	12.33556	12.68250	13.04121	13.41209	13.79555	14.19203	14.60196	12
13	13.39724	13.80933	14.23683	14.68033	15.14044	15.61779	16.11303	13
14	14.46423	14.94742	15.45088	15.97394	16.51895	17.08632	17.67698	14
15	15.53655	16.09690	16.68214	17.29342	17.93193	18.59891	19.29568	15
16	16.61423	17.25786	17.93237	18.63929	19.38022	20.15688	20.97103	16
17	17.69730	18.43044	19.20136	20.01207	20.86473	21.76159	22.70502	17
18	18.78579	19.61475	20.48938	21.41231	22.38635	23.41444	24.49969	18
19	19.87972	20.81090	21.79672	22.84056	23.94601	25.11687	26.35718	19
20	20.97912	22.01900	23.12367	24.29737	25.54466	26.87037	28.27968	20
21	22.08401	23.23919	24.47052	25.78332	27.18327	28.67649	30.26947	21
22	23.19443	24.47159	25.83758	27.29898	28.86286	30.53678	32.32890	22
23	24.31040	25.71630	27.22514	28.84496	30.58443	32.45288	34.46041	23
24	25.43196	26.97346	28.63352	30.42186	32.34904	34.62647	36.66653	24
25	26.55912	28.24320	30.06302	32.03030	34.15776	36.45926	38.94986	25
26	27.69191	29.52563	31.51397	33.67091	36.01171	38.55304	41.31310	26
27	28.83037	30.82089	32.98668	35.34432	37.91200	40.70963	43.75906	27
28	29.97452	32.12910	34.48148	37.05121	39.85980	42.93092	46.29063	28
29	31.12439	33.45039	35.99870	38.79223	41.85630	45.21885	48.91080	29
30	32.28002	34.78489	37.53868	40.56808	43.90270	47.57546	51.62268	30
31	33.44142	36.13274	39.10176	42.37944	46.00027	50.00268	54.42947	31
32	34.60862	37.49408	40.68829	44.22703	48.15028	52.50276	57.33450	32
33	35.78167	38.86901	42.29861	46.11157	50.35403	55.07784	60.34121	33
34	36.96058	40.25770	43.93309	48.03380	52.61289	57.73018	63.45315	34
35	38.14538	41.66028	45.59209	49.99448	54.92821	60.46208	66.67401	35
36	39.33611	43.07688	47.27597	51.99437	57.30141	63.27594	70.00760	36
37	40.53279	44.50765	48.98511	54.03425	59.73395	66.17422	73.45787	37
38	41.73545	45.95272	50.71989	56.11494	62.22730	69.15945	77.02889	38
39	42.94413	47.41225	52.48068	58.23724	64.78298	72.23423	80.72491	39
40	44.15885	48.88637	54.26789	60.40198	67.40255	75.40126	84.55028	40
41	45.37964	50.37524	56.08191	62.61002	70.08762	78.66330	88.50954	41
42	46.60654	51.87899	57.92314	64.86222	72.83981	82.02320	92.60787	42
43	47.83957	53.39778	59.79199	67.15947	75.66080	85.48389	96.84863	43
44	49.07877	54.93176	61.68887	69.50266	78.55232	89.04841	101.23831	44
45	50.32416	56.48107	63.61420	71.89271	81.51613	92.71986	105.78162	45
46	51.57579	58.04589	65.56841	74.33056	84.55403	96.50146	110.48403	46
47	52.83366	59.62634	67.55194	76.81718	87.66789	100.39650	115.35097	47
48	54.09783	61.22261	69.56522	79.35352	90.85958	104.40840	120.38826	48
49	55.36832	62.83483	71.60870	81.94059	94.13107	108.54065	125.60185	49
50	56.64516	64.46318	73.68283	84.57940	97.48435	112.79687	130.99791	50
n	$\frac{1}{2}\%$	1%	1½%	2%	2½%	3%	3½%	n

Amount of an Annuity

$$S_{\overline{n}|i} = \frac{(1+i)^n - 1}{i}$$

<i>n</i>	4%	5%	6%	7%	8%	9%	10%	<i>n</i>
1	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1
2	2.04000	2.05000	2.06000	2.07000	2.08000	2.09000	2.10000	2
3	3.12160	3.15250	3.18360	3.21490	3.24640	3.27810	3.31000	3
4	4.24646	4.31013	4.37462	4.43994	4.50611	4.57313	4.64100	4
5	5.41632	5.52563	5.63709	5.75074	5.86660	5.98471	6.10510	5
6	6.63298	6.80191	6.97532	7.15329	7.33593	7.52333	7.71561	6
7	7.89829	8.14201	8.39384	8.65402	8.92280	9.20043	9.48717	7
8	9.21423	9.54911	9.89747	10.25980	10.63663	11.02847	11.43589	8
9	10.58280	11.02656	11.49132	11.97799	12.48756	13.02104	13.57948	9
10	12.00611	12.57789	13.18079	13.81645	14.48656	15.19293	15.93742	10
11	13.48635	14.20679	14.97164	15.78360	16.64549	17.56029	18.53117	11
12	15.02581	15.91713	16.86994	17.88845	18.97713	20.14072	21.38428	12
13	16.62684	17.71298	18.88214	20.14064	21.49530	22.95338	24.52271	13
14	18.29191	19.59863	21.01507	22.55049	24.21492	26.01919	27.97498	14
15	20.02359	21.57856	23.27597	25.12902	27.15211	29.36092	31.77248	15
16	21.82453	23.65749	25.67253	27.88805	30.32428	33.00330	35.94973	16
17	23.69451	25.84037	28.21288	30.84022	33.75023	36.97370	40.54470	17
18	25.64541	28.13238	30.90565	33.99903	37.45024	41.30134	45.59917	18
19	27.67123	30.53900	33.75999	37.37896	41.44626	46.01846	51.15909	19
20	29.77808	33.06595	36.78559	40.99549	45.76196	51.16012	57.27500	20
21	31.96920	35.71925	39.99273	44.86518	50.42292	56.76453	64.00250	21
22	34.24797	38.50521	43.39229	49.00574	55.45676	62.87334	71.40275	22
23	36.61789	41.43048	46.99583	53.43614	60.89330	69.53194	79.54302	23
24	39.08260	44.50200	50.81558	58.17667	66.76476	76.78981	88.49733	24
25	41.64591	47.72710	54.86451	63.24904	73.10594	84.70090	98.34706	25
26	44.31174	51.11345	59.15638	68.67647	79.95442	93.32398	109.18177	26
27	47.08421	54.66913	63.70577	74.48382	87.35077	102.72313	121.09994	27
28	49.96758	58.40258	68.52811	80.69769	95.33883	112.96822	134.20994	28
29	52.96629	62.32271	73.63980	87.34653	103.96594	124.13536	148.63093	29
30	56.08494	66.43885	79.05819	94.46079	113.28321	136.30754	164.49402	30
31	59.32834	70.76079	84.80168	102.07304	123.34587	149.57522	181.94342	31
32	62.70147	75.29883	90.88978	110.21815	134.21354	164.03699	201.13777	32
33	66.20953	80.06377	97.34316	118.93343	145.95062	179.80032	222.25154	33
34	69.85791	85.06697	104.18375	128.25876	158.62667	196.98234	245.47670	34
35	73.65222	90.32031	111.43478	138.23688	172.31680	215.71075	271.02437	35
36	77.59831	95.83632	119.12087	148.91346	187.10215	236.12472	299.12681	36
37	81.70225	101.62814	127.26812	160.33740	203.07032	258.37595	330.03949	37
38	85.97034	107.70955	135.90421	172.56102	220.31595	282.62978	364.04343	38
39	90.40915	114.09502	145.05846	185.64029	238.94122	309.06646	401.44778	39
40	95.02552	120.79977	154.76197	199.63511	259.05652	337.88245	442.59256	40
41	99.82654	127.83976	165.04768	214.60957	280.78104	369.29187	487.85181	41
42	104.81960	135.23175	175.95054	230.63224	304.24352	403.52813	537.63699	42
43	110.01238	142.99337	187.50758	247.77650	329.58301	440.84566	592.40069	43
44	115.41288	151.14301	199.75803	266.12085	356.94965	481.52177	652.64076	44
45	121.02939	159.70016	212.74351	285.74931	386.50562	525.85873	718.90484	45
46	126.87057	168.68516	226.50812	306.75176	418.42607	574.18602	791.79532	46
47	132.94539	178.11942	241.09861	329.22439	452.90015	626.86276	871.97485	47
48	139.26321	188.02539	256.56453	353.27009	490.13216	684.28041	960.17234	48
49	145.83373	198.42666	272.95840	378.99900	530.34274	746.86565	1057.18957	49
50	152.66708	209.34800	290.33590	406.52893	573.77016	815.08356	1163.90853	50
<i>n</i>	4%	5%	6%	7%	8%	9%	10%	<i>n</i>

NLC - BNC



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